Jurnal Ekonomi Malaysia 47(2) 2013 25 - 37

Who Pays and Who Gets What from National Parks Protection? Case of Taman Negara in Malaysia

(Siapa Membayar dan Siapa Mendapat Manfaat dari Perlindungan Taman Negara? Kes Taman Negara Malaysia)

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AABSTRACT

The Malaysian National Park or Taman Negara (TN) is a totally protected forest which covers an area over 4,000 square kilometres, straddling across three relatively less developed north-eastern states of Pahang, Terengganu and Kelantan in Peninsular Malaysia. Forest conservation inevitably entails equity-efficiency tradeoffs. The local communities may lose all or most of the direct benefits provided by the resource, including foregone benefits such as agricultural development and other alternative uses. While all the other indirect and non-use values may accrue to both local and external communities, foregone benefits may pose a serious policy issue should the affected communities be relatively poorer or have less access to alternative sources of economic growth and development. This study conducts an economic valuation of the benefits and costs of Taman Negara's conservation and its resulting equity impacts to the various stakeholders - global community, Malaysian federal and state governments, and the local community. The study specifically compares the benefits from TN conservation against alternative land uses, namely sustainable logging, and sustainable logging and oil palm development. Based on a social discount rate of 2 percent and lower bound price estimates of carbon and marketed goods prices, the study shows that existing conservation policies provide higher economic benefits compared to other land use options. However, at higher discount rates of 5 and 8 percent, the benefits from the conservation management option against alternative uses may turn negative. Overall results demonstrate a clear equity issue between those who benefited from forest conservation and especially the three relatively less developed states which incurred substantial benefits foregone. To address this issue at the national level, it is recommended that national conservation policies consider the establishment of a National Forest Conservation Fund for compensation of environmental services provided by protected forests, similar to the Payment for Environmental Services scheme. Some portion of the revenue from marketed goods provided by the park particularly recreational services may also be allocated to the state governments. At the international level, the ongoing REDD Plus programmes need to take into account cross country equity issue, particularly countries that have long been involved in pre-existing conservation programme such as the Malaysian Taman Negara.

Keywords: National Parks protection; Taman Negara Malaysia; total economic valuation; efficiency-equity tradeoffs in forest protection

ABSTRAK

Taman Negara Malaysia ialah sebuah kawasan hutan yang dilindungi. Ia seluas 4,000 kilometer persegi, terletak di kawasan yang bersempadanan dengan tiga buah negeri yang relatif kurang maju di Semenanjung Malaysia - Kelantan, Terengganu dan Pahang. Perlindungan hutan mewujudkan kesan tukarganti antara ekuiti dan kecekapan. Masyarakat tempatan kerugian manfaat langsung yang dibekalkan oleh sumber Taman Negara, termasuk kos lepas seperti hasil dari pembangunan pertanian dan kegunaan lain.Kebanyakan manfaat tak langsung lain dan nilai bukan penggunaan diperoleh komuniti global. Kos lepas boleh menjadi isu dasar yang serius jika komuniti yang terkesan adalah relatif miskin dan kekurangan akses kepada sumber-sumber alternatif untuk pertumbuhan dan pembangunan ekonomi. Kajian ini melakukan penilaian ekonomi keatas faedah dan kos dari perlaksanaan dasar perlindungan Taman Negara dan kesan ekuiti kepada pelbagai kumpulan berkepentingan - komuniti global, kerajaan persekutuan, kerajaan negeri dan juga masyarakat setempat. Secara spesifik, kajian membandingkan manfaat dari perlindungan Taman Negara dengan kegunaan alternatif seperti pembalakan lestari, dan pembalakan lestari dan pembangunan sawit. Berdasarkan kadar diskaun 2 peratus dan batas bawah harga pasaran karbon dan barangan pasaran, kajian mendapati dasar perlindungan hutan memberikan manfaat ekonomi yang lebih tinggi berbanding dengan guna tanah lain. Walaubagaimanapun, pada kadar diskaun 5 dan 8 peratus, manfaat dari perlindungan hutan menjadi negatif. Dapatan keseluruhan menunjukkan isu ekuiti yang jelas antara mereka yang menerima faedah dari perlindungan

Taman Negara dan mereka (negeri-negeri yang menempatkan Taman Negara) yang menanggung kos dari segi faedah yang terpaksa dilepaskan.Untuk mengatasi isu ini di peringkat nasional, dicadangkan dasar perlindungan alam sekitar negara mengambilkira penubuhan Tabung Konservasi Nasional untuk tujuan membayar pampasankepada komuniti yang kehilangan kos lepas dari perlaksanaan dasar perlindungan, serupa dengan konsep bayaran untuk perkhidmatan alam sekitar (PES). Beberapa komponen hasil dari perkhidmatan Taman Negara seperti kutipan bayaran masuk dari perkhidmatan rekerasi juga perlu diperuntukkan kepada kerajaan negeri. Di peringkat antarabangsa, program REDD Plus dicadangkan mengambilkira isu ekuiti antarabangsa, terutamanya negara-negara yang telah lama terlibat dalam program-program konservasi hutan seperti kes Taman Negara Malaysia.

Kata kunci: Perlindungan Taman Negara, Taman Negara Malaysia, Penilaian nilai ekonomi jumlah, Tukarganti kecekapan-ekuiti dalam perlindungan hutan

BACKGROUND

The Malaysian National Park or Taman Negara (TN) is a protected forest that covers an area of 4,343 square kilometres spanning across the three north-eastern states of Pahang, Terengganu and Kelantan in Peninsular Malaysia. Each state contributes some 6-7 percent of their total land area to TN. Taman Negara was gazetted as a protected forest way back in 1938 by the then Wildlife Commission of the British colonial government. Its original name was King George National V National Park, the king who ruled Britain and her colonies at the time. Under the various state enactments (Pahang Enactment 1939, Terengganu Enactment 1939 and Kelantan Enactment 1938), which provided the legal basis for the establishment of TN, the National Park was established especially for the purpose of perpetual protection and preservation of indigenous fauna and flora of the country and for the preservation of objects and places of aesthetic historical or scientific interests. Based on the sheer size of the area, TN is considered as the largest national park in South East Asia.

With the exception of Pahang, the two states of Kelantan and Terengganu have been among the poorest and least developed states in Malaysia. In 2004, the average monthly household income for the states was RM1,829.00 and RM1,984.00, respectively, as compared to the national average of RM3,249.00 (Malaysia 2006). With respect to poverty rate, Terengganu in Peninsular Malaysia had the highest poverty rate of 15.4 percent, followed by Kelantan at 10.6 percent, as compared to the national poverty rate of 5.7 percent. As such poverty eradication programs and rural development have became a major policy focus of the affected states.

Forest protection inevitably entails equity-efficiency tradeoffs. The local communities may lose all or most of the direct benefits provided by the resource, including foregone benefits such as agricultural development and other alternative uses. The loss of foregone benefits from forest conservation, especially for agricultural development for the landless rural poor has long been realized by many state governments in Malaysia. This has been demonstrated by the reluctancy of the states to approve new protected areas. A clear example is the unwillingness of the states of Pahang and Johor to agree to the federal government's request to gazette parts of the states' forests as new protected areas. Under the 3rd Malaysia Plan (1976-80), the federal government had identified the Endau-Rompin forest in Johor and Pahang as the second National Park (TN) (Collins et al. 1991; Berger 1990). Initially, the state government steadfastly refused to hand over the Endau-Rompin area to the federal government as required by the National Parks Act 1980. In1988, following negotiations with the federal government and continuing pressure from various parties, both the state governments finally conceded to accord the status of national park to the 930-square kilometre forested area of Endau-Rompin.

Given the socio-economic background of the TN affected states and the ever increasing need for new sources of economic growth, it is expected that resentment on the equity issue of TN protection would grow over the years. This is especially more so when the decision to establish the TN was made many years ago (in 1938), long before Malaysia gained its independence in 1957. This issue represents a classical case of conservation and development tradeoffs. Given the above background, this study attempts to appraise the benefits and cost which accrues to different groups of stakeholders from the effects of conservation of TN. Such analysis will help espouse the quantum of contribution of the less developed states for a public cause that benefits a wide range of stakeholders including the global community.

In this study, the total economic value approach was used to analyse the economic merits of forest conservation and alternative uses. Alternative land use options which reflect the likely opportunity costs to the three affected states include sustainable logging, and sustainable logging and oil palm cultivation.

The next section of this paper discusses the concept of conservation policy and equity; the third section explains the methodology for the evaluation of benefits flow of TN; the fourth section presents the results of the economic assessment of forest management alternatives; and the fifth section discusses the policy implications and concluding remarks.

CONSERVATION POLICY AND EQUITY

Table1 depicts the relationship between forest conservation policy and equity. When a forest tract is totally protected by means of policy, the local community inevitably loses all or most of the direct benefits provided by the resource, including foregone benefits such as agricultural development and other alternative uses. While all the other indirect uses and non-use values may accrue to both local and external communities, foregone benefits may pose a serious policy issue should the affected communities be relatively poorer or have less access to alternative sources of economic growth and development. It is thus clear that the local communities would have to bear the brunt of losing the various direct and foregone benefits due to forest protection policy. This study as mentioned earlier examines the equity impacts of TN conservation by assessing the economic values of forgone benefits incurred by the affected communities. Note the concept of direct, indirect and non-use values in this study follows that of the standard total economic value taxonomy of environmental resources according to Brookshire et al.(1980) and Pearce and Warford(1994).

TABLE 1. Accrued Benefits from Environmental Services

Type of Benefit	Local Community	External Community
Use Values:		
Direct	*X*	-
Indirect	√	√
Non-Use Values:		
Bequest Value	√	√
Existence Value	√	√

Note: √ is value accruable to the respective communities while X is the foregone direct benefits due to forest protection.

METHODOLOGY

In assessing the economic values of TN, the resource was likened to an asset which generates varying benefit flows under various management options. The total economic value (TEV) of TN service flows was estimated for each management scenario and compared against the baseline scenario (status quo) for a specified period. In this study, the baseline scenario (full conservation) was compared with two other management options, namely sustainable logging, and sustainable logging with oil palm development. In essence, the choice of options is based on what options might be technically and economically feasible given the bio-physical nature of the resource. The two options are thought to be rational land-use alternatives *vis a vis* total protection. Specifically, the following steps were undertaken in assessing the benefit flows under the TEV framework;

1. Identifying and estimating the flow of good sand services derived from each management option;
2. Estimating the Net Present Value (NPV) for each benefit flow using a range of social discount rates;
3. Estimating the TEV by aggregating the NPV of each benefit stream for each management option, and
4. Comparing the TEV of the baseline (status quo) option with the given management alternatives and discussing the implications thereof.

Figure 1 illustrates the economic assessment framework for TN while Figure 2 depicts the management options considered in the study. Part 'a' of Figure 2 shows the management option sevaluated, namely:

1. Full conservation (status quo scenario)
2. Sustainable logging
3. Sustainable logging and oil palm cultivation

The benefits assessed under the full conservation scenario included recreation, carbon sequestration and non-use values (NUV) of conservation benefits. Under this scenario, logging and harvesting of forest products (rattan) are strictly prohibited. Therefore, the net benefits from timber and rattan are zero. Erosion costs were not assessed as it occurs naturally in unlogged forest areas. The economic benefits of water catchment regulation and medicinal plants were also excluded from this study. However, this may not affect the overall outcome of the study as both provide positive benefits to the existing conservation management.

For the sustainable logging option, only the value of timber stumpage in areas permitted by law and which is economically beneficial was included in the estimation. Highlands exceeding 1,000 metres above sea level were ruled out in the assessment. These were assumed to be fully protected areas. The size of forest area presumably permitted for sustainable logging was 385,214.04 hectares. The accrued benefits and costs under this scenario included timber stumpage, rattan and carbon storage. Soil erosion was considered as cost and therefore deducted from the benefit stream in this scenario. The estimated cost of erosion in this study is based on the benefit transfer method from a study conducted by Mohd Shahwahid et al. (1997).

For sustainable logging and oil palm cultivation management option, 15 percent of the total area in TN was found to be suitable for agriculture (DWNP 1987). Similar to sustainable logging, only areas permitted by the law and which are economically beneficial were assessed. The areas to be considered for sustainable logging and oil palm cultivation were 317,624 hectares and 67,590 hectares, respectively. The rest shall remain under full conservation. The services and goods valued under this management option included stumpage values, rattan, carbon storage and harvested oil palm fresh fruit bunches. Again soil erosion was considered as cost and was deducted from the benefit stream.

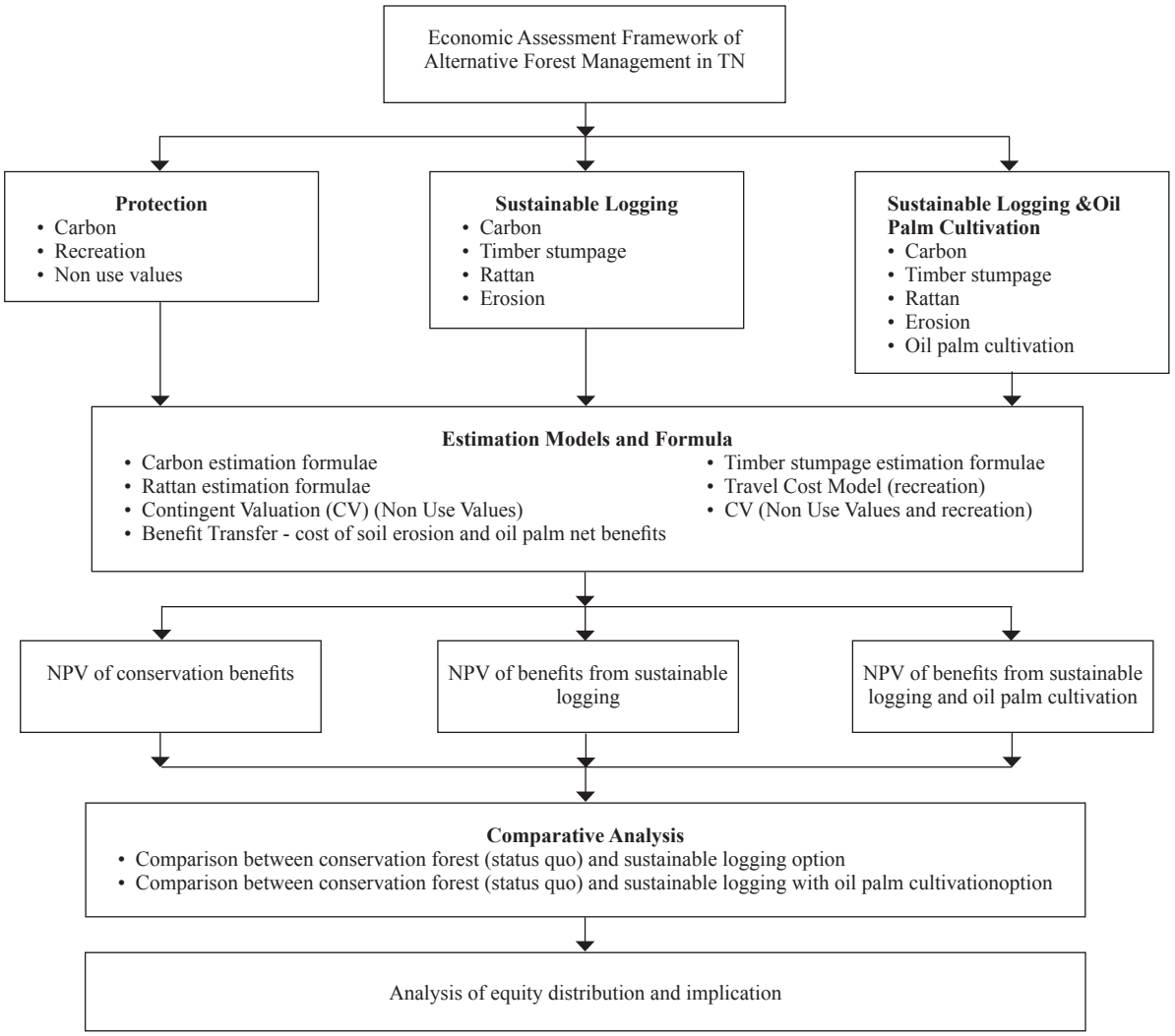

FIGURE 1. Economic Assessment Framework of Forest Management Options for TN

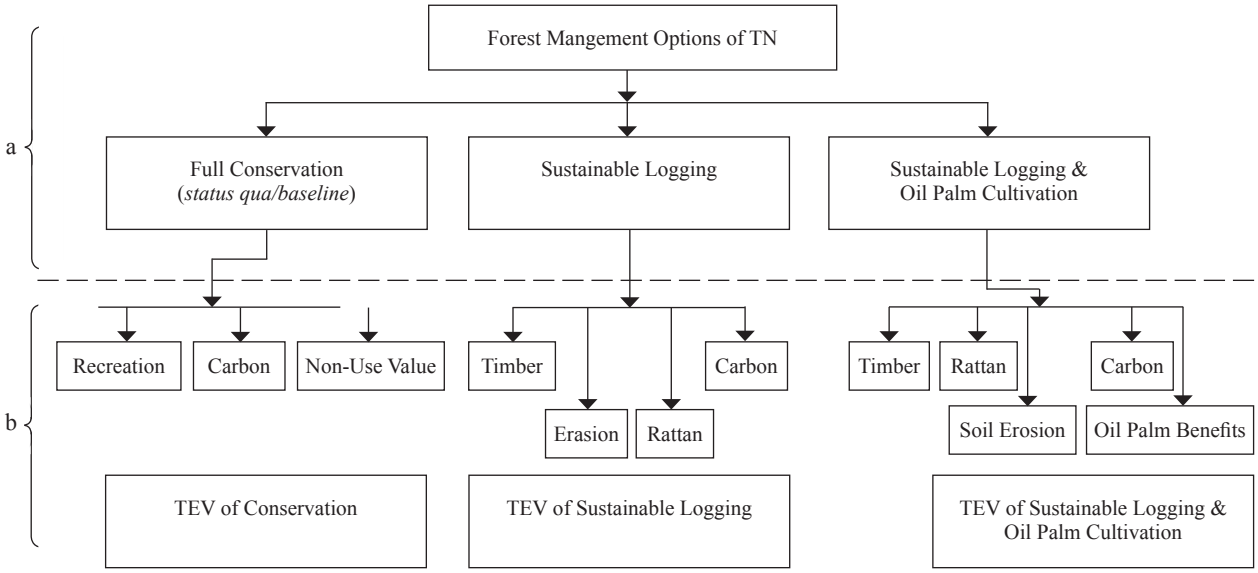

FIGURE 2. Forest Management Options for Taman Negara

The benefits flow for each forest management scenario was estimated for a period of 56 years, equivalent to two logging or oil palm harvest cycles. The first logging cycle was allocated a higher benefits stream compared to the second. Arrange of social discount rates from 2 to15 percent was employed to obtain the NPV for each benefit type. The NPV for each service flow was then summed to obtain the TEV for each forest management option.

The TEV for the status quo option (forest conservation) was compared with the alternatives. Table 2 illustrates the framework and the information needed (including prices and data sources) to estimate the economic value of goods and services provided by TN. Readers who are interested in the details of the framework, specific model assumptions and estimation are to refer to Ahmad Mohd Zin (2004) or request them from the authors.

FINDINGS AND DISCUSSIONS

Recall, three options were presumed for the forest management of TN -full conservation, sustainable logging, and sustainable logging with oil palm cultivation. The full conservation option reflects the ongoing management plan, whereby forest-based recreation is the only activity allowed for TN. In evaluating the benefits of TN, the TEV approach entails the comparison of the TEV of the status quo with that of the two alternatives.

COMPARISON OF TEV BENEFITS BETWEEN CONSERVATIONANDSUSTAINABLELOGGING

Table 3 compares the TEV between conservation management and sustainable logging management for TN based on a range of social discount rates.

Under the current management (full conservation), the estimation of benefits for all discount rates (2-15 percent) shows carbon capture constitutes 95 percent of TEV, followed by Non-use Value (NUV) at 4.7 percent and recreational value (0.1 percent). For sustainable logging option, the benefits comprise 80 percent carbon, 20 percent timber and less than 0.2 percent rattan. Erosion (1.6 percent) was considered as cost and was thus subtracted from the benefits derived from logging.

For sustainable logging, recreational benefits were presumed to be zero or at the very least negligible. This was based on the fact that visitors tend to visit TN, not for the typical forest-based recreational indulgence, but are rather motivated by the preservation of an ancient forest

TABLE 2. Assessment framework of flow-on benefits of forest services in TN[+]

Type of Goods/ Service	Form of Goods/ Service	Type of Value	Method of Assessment	Data Source/ Approach
Timber	Wood	Direct use	Market price	Inventory of third forest (Forestry Department) – area size and forest type, average annual growth, diameter sizeandaverage hectare yield and others[1]. Price ranges from RM315 (low)-RM379 (high) per cubic meter[6]
Non-timber	Rattan	Direct use	Market price	Inventory of second forest (Forestry Department)[2]
Recreation	Recreation	Direct use	Contingent Valuation (CV)[7]	Fieldwork –survey on visitors to area of study[6]
Oil palm cultivation	Oil palm fruit bunches	Direct use	Market price	FELCRA – Project proposal paper for Air Hitam, Negeri Sembilan[3]. Modest price level of RM240 per ton assumed[6]
Carbon	Carbon capture	Indirect use	Mitigation method	Past studies on biomassand carbon content of forests and oil palm cultivation[4]. Modest price ranges USD5 (low) - USD9 (high) per ton[6]
Erosion	Effects of soil erosion	Indirect use	(Benefit transfer) cost of dredging silt	Study by Mohd Shahwahid et al.[5]
Non-use value	Values: bequest, existence and options	Opportunity cost	Contingent Valuation (CV)[7]	Fieldwork–2003 CV field survey (residents in Taiping, Perak and Nilai, Negeri Sembilan[6,7])

Note: 1. JPSM (1997a; 1997b; 1997c); 2. JPSM (1988a; 1988b; 1988c); 3. FELCRA Head Office Southern Branch (unpublished) (1995); 4. Brown et al. (1994); 5. Mohd Shahwahid et al. (1997); 6. Ahmad Mohd Zin (2004); 7. Appendix I demonstrates the detailed results from the CV survey for the estimation of recreational values and non-use values of TN biodiversity.

[+] Detailed information on the framework and sources of data are found in Ahmad Mohd Zin (2004).

TABLE 3. Comparison of TEV of Conservation Forest against Sustainable Logging (RM Million)

Benefit	Discount Rate				
	2%	5%	8%	10%	15%
A					
TIMBER	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
RATTAN	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
EROSION	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
RECREATION	52.996 (0.1)	25.017 (0.1)	14.437 (0.1)	10.890 (0.1)	6.520 (0.1)
OIL PALM	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
CARBON	42,441.20 (95.1)	23,655.89 (95.4)	15,621.31 (95.7)	12,606.33 (95.8)	8,441.46 (95.9)
NUV	2,140.720 (4.8)	1,110.678 (4.5)	692.670 (4.2)	543.758 (4.1)	348.066 (4.0)
TEV A	44,634.92 9	24,791.59	16,328.42	13,160.98	8,796.05
B					
TIMBER	8,525.867 (20.1)	5,082.146 (20.5)	3,483.177 (20.6)	2,852.556 (20.5)	1,942.474 (20.3)
RATTAN	95.519 (0.2)	52.684 (0.2)	34.226 (0.2)	27.337 (0.2)	17.894 (0.2)
EROSION*	707.146 (1.6)	394.649 (1.6)	260.279 (1.5)	210.044 (1.5)	140.650 (1.5)
RECREATION	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
OIL PALM	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
CARBON	34,468.63 (81.3)	20,059.11 (80.9)	13,673..55 (80.7)	11,220.37 (80.8)	7,727.37 (80.9)
NUV	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
TEV B	42,382.87	24,799.29	16,930.68	13,890.22	9,547.09
TEV A – TEV B	2,252.05	-7.71	-602.26	-729.24	-751.04

Note: A = Forest conservation (status quo); B = Sustainable logging management; NUV = Non-use value; TEV= Total economic value; Figures in parentheses are percentage of TEV

* Erosion is a cost flow

track with all its unique indigenous floras and faunas. If such conservation policy for TN is abolished and replaced by sustainable logging activities, albeit partially, TN will be no different from other forested areas in Malaysia.

At a discount rate of 2 percent, the TEV from conservation and sustainable logging option was estimated at RM44.635 billion and RM42.383 billion, respectively. This reflects a surplus in TEV of RM2.3 billion favouring the conservation forest or current management plan

The above findings indicate that at a discount rate of 2 percent, the benefits gained from investments in forest conservation are greater than that of sustainable logging. However, if the discount rate is raised to 5 and 8 percent, the net benefit from conservation falls to negative RM7.7 million and negative RM602.3 million, respectively. These finding simply that logging provides higher return on investment in the early stages as compared to benefits from conservation. It also denotes that as society values current consumption more highly (reflected by higher discount rates) relative to future consumption, benefits from resource conversion (logging) that will provide more current consumption possibilities will exceed that of conservation.

COMPARISON OF TEV BETWEEN CONSERVATION FOREST AND SUSTAINABLE LOGGING AND OIL PALM CULTIVATION

Table 4 compares the benefits from forest conservation and investments in sustainable logging and oil palm cultivation. Note the benefits of forest conservation are similar to the previous scenario (Table 3). At the 2 percent discount rate, the TEV from sustainable logging and oil palm cultivation comprises 71.9 percent of carbon, 20.4 percent timber, 9.3 percent oil palm and 0.2 percent rattan. Erosion is considered as a cost to the investment, estimated at 1.8 percent of total benefits. As with logging, the recreational benefit under sustainable logging and oil palm cultivation is presumed to be zero or negligible.

Based on Table 4, given a 2 percent discount rate, the TEV from logging and oil palm cultivation is calculated at RM44.2 billion. The benefits from conservation of forest are found to exceed that of sustainable logging and oil palm cultivation by RM443 million. This surplus benefit from forest conservation is considerably lower relative to the previous scenario (RM2.3 billion) (Table 3). These findings clearly suggest that the option for sustainable logging and oil palm cultivation potentially results in

TABLE 4. TEV Benefit Surplus of Conservation against Sustainable Logging and Oil Palm Cultivation (RM Million)

	Discount Rate				
Benefit	2%	5%	8%	10%	15%
A					
TIMBER	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
RATTAN	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
EROSION	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
RECREATION	52.996 (0.1)	25.017 (0.1)	14.437 (0.1)	10.890 (0.1)	6.520 (0.1)
OIL PALM	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
CARBON	42,441.20 (95.1)	23,655.89 (95.4)	15,621.31 (95.7)	12,606.33 (95.8)	8,441.46 (95.9)
NUV	2,140.720 (4.8)	1,110.678 (4.5)	692.670 (4.2)	543.758 (4.1)	348.066 (4.0)
TEV A	44,634.92 9	24,791.59	16,328.42	13,160.98	8,796.05
B					
TIMBER	9,004.57 (20.4)	6,186.94 (23.8)	4,859.79 (27.1)	4,324.73 (29.2)	3,520.89 (33.8)
RATTAN	93.578 (0.2)	53.725 (0.2)	36.629 (0.2)	30.257 (0.2)	21.489 (0.2)
EROSION*	789.871(1.8)	440.817 (1.7)	290.727 (1.6)	234.616 (1.6)	157.104 (1.5)
RECREATION	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
OIL PALM	4,114.93 (9.3)	1,873.52 (7.2)	936.34 (5.2)	593.31 (4.0)	138.84 (1.3)
CARBON	31,768.77 (71.9)	18,302.32 (70.5)	12,364.68 (69.1)	10,093.69 (68.2)	6,897.22 (66.2)
NUV	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
TEV B	44,191.977	25,975.588	17,906.712	14,807.371	10,421.335
TEV A – TEV B	442.952	-1,184.098	-1,578.292	-1,646.391	-1,625.285

Note: A = Conservation management; B = Sustainable logging and oil palm cultivation management; NUV = Non-use value; TEV = Total economic value; Figures in parentheses arepercentage of TEV

* Erosion is considered as cost

higher economic returns as compared to sustainable logging only; and is quite on par with forest conservation or the status quo option even at the lowest discount rate.

If the discount rate is increased to 5 and 8 percent, the surplus benefit from the conservation management option against sustainable logging and oil palm cultivation will beat negative RM1.2 billion and negative RM1.6 billion, respectively. These findings reinforce the earlier argument that sustainable logging and oil palm cultivation option will result in potentially higher economic returns than either purely sustainable logging or forest conservation options.

FOREST MANAGEMENT ALTERNATIVES AND EQUITY DISTRIBUTION

Each TN management alternative poses different impacts on the distribution of equity among the various stakeholders. The accrued benefits and costs on the various communities for each land use option are illustrated in Table 5.

Based onTable 5, the benefits of timber and rattan in the form of royalties will accrue to the state government. These benefits may be utilized by the state government for socio-economic development, poverty alleviation, or general administrative expenditure. The effects of government expenditure (through economic multiplier) will be realized by the general population of the state involved. Rattan is gathered by the rattan harvesters, comprising local residents. The benefits of recreation will accrue to local and external communities, both with in and outside of Malaysia. Oil palm benefits will accrue mainly to the local population. Carbon and NUV will be shared among local residents and the rest of the population in Malaysia as well as global communities.

Logging, oil palm cultivation and rattan harvesting will impose costs in the form of soil erosion and these will be borne by the state governments and the local communities. With respect to recreation, external communities will not incur any cost but the local communities who utilise the forest resource for recreational services will suffer loss of revenue in the form of foregone benefits, namely from timber, agriculture and rattan. Similarly for carbon and NUV provided by TN, they generate benefit to both local and global communities, but the associated cost will be borne

TABLE 5. Costs and Net Benefit of TN Alternative Forest Management to the Different Communities

Type of Goods/ Service	Local Residents/ State Government		Population in Malaysia		Global Community	
	Benefit	Cost	Benefit	Cost	Benefit	Cost
Timber	√	X	X	X	X	X
Rattan	√	X	X	X	X	X
Recreation	√	√	√	X	√	X
Oil palm	√	X	X	X	X	X
Carbon	√	√	√	X	√	X
Non Use Values	√	√	√	X	√	X
Impact of erosion	X	√	X	X	X	X

Note: √ indicates the accrued cost or benefit, *X* indicates not accrued cost or benefit

by the local residents and state government; again in the form of benefits foregone, i.e., loss of forest products and collection of timber royalties. Likewise, the federal government bears the cost through the provision of annual budget for the adequate enforcement and maintenance of TN conservation.

EQUITY EFFECT OF SUSTAINABLE LOGGING

Based on Table 3, the current TN conservation policy generates a value of RM42.4 billion, NUV RM2.1 billion and recreational value RM52.9 million. Meanwhile, the net benefit of conservation relative to sustainable logging at the 2 percent discount rate is RM2.3 billion.

From the viewpoint of equity, all of the above benefits are shared by the local and global communities, including the whole population of Malaysia (Table 5). In terms of benefits foregone, given the same discount rate, all the three states of Kelantan, Pahang and Terengganu will suffer losses from timber and rattan royalties amounting to RM8.5 billion and RM95.5 million respectively. The breakdown of benefits foregone under various discount rates for the three affected states is shown inTable 6.

Based on the 2 percent discount rate, the conservation policy implemented in Taman Negara has resulted in varying foregone benefits from timber and rattan across the three states. Kelantan is estimated to lose RM2.3 billion and RM17.9 million; Pahang at RM4.9 billion and RM57.6 million, while Terengganu at RM1.3 billion

TABLE 6. Benefits Foregone from Sustainable Logging under Various Discount Rates

Discount Rate	Item	State			Total
		Kelantan	Pahang	Terengganu	
2%	Timber	2,280.424	4,906.538	1,338.898	8,525.86
	Rattan	17.921	57.637	19.966	95.52
	Sub-Total	2,298.35	4,964.18	1,358.86	8,621.38
5%	Timber	1,434.593	2,852.793	794.756	5,082.14
	Rattan	10.789	30.599	11.296	52.68
	Sub-Total	1,445.38	2,883.39	806.05	5,134.83
8%	Timber	1,011.817	1,927.921	543.437	3,483.18
	Rattan	7.501	19.243	7.482	34.23
	Sub-Total	1,019.32	1,947.16	550.92	3,517.40
10%	Timber	837.347	1,570.546	444.662	2,852.56
	Rattan	6.197	15.107	6.033	27.34
	Total	843.544	1,585.65	450.695	2,879.89
15%	Timber	576.870	1,063.103	302.500	1,942.47
	Rattan	4.282	9.597	4.014	17.89
	Sub-Total	581.152	1,072.697	306.514	1,960.37

and RM19.9 million, from timber and rattan benefits, respectively.

EQUITY EFFECT OF SUSTAINABLE LOGGING AND OIL PALM CULTIVATION

Based on Table 4, the surplus benefit from conservation as compared to sustainable logging and oil palm cultivation at the 2 percent discount rate is RM442.9 million. However, this benefit becomes negative (-RM1.2 billion) if the discount rate is raised to 5 percent.

In terms of distribution of benefits, should the forest conservation policy continues, the external and global community at large will stand to benefit some RM42.4 billion in terms of carbon storage, RM2.1 billion in NUV benefits and RM52.9 million in recreational value. On the other hand, the local community and state governments will lose an estimated value of RM13.2 billion; RM9.0 billion in timber royalties, RM4.1 billion in oil palm revenue and RM93.6 million in rattan revenue (Table 7).

In terms of distribution of benefits according to state at the 2 percent discount rate, Kelantan will stand to lose about RM3.3 billion; RM2.4 billion in timber royalties, RM947.7 million in oil palm revenue and RM17.6 millionin rattan revenue. For Pahang, the estimated loss totals RM7.3 billion; RM5.2 billion in timber royalties, RM2.1 billion in oil palm revenue and RM59.7 million in rattan revenue while for Terengganu, the estimated loss stands at RM2.5 billion: RM1.4 billion in timber royalties, RM1.1 billion in palm oil revenue and RM16.3 million in rattan revenue.

POLICY IMPLICATIONS AND CONCLUDING REMARKS

The study has found that TN creates a huge disparity between those who benefit (Malaysian and global communities) and those who bear the costs (local residents and state governments). The situation is further exacerbated as all the three states, namely Pahang, Kelantan and Terengganu, have relatively lower economic development levels with higher poverty rates especially for the latter two states.

Potential economic loss incurred by the state government and local community for foregoing the sustainable logging and oil palm cultivation option is higher than the sustainable logging alternative. Given a 2 percent discount rate, the potential net TEV losses include RM9.0 billion in timber stumpage, RM93.6 million in rattan revenue and RM4.1 billion in oil palm revenue. In comparison, the potential earnings from sustainable

TABLE 7. Benefits Foregone from Sustainable Logging and Oil Palm Cultivation under Various Discount Rates

Discount Rate	Item	State			Total
		Kelantan	Pahang	Terengganu	
2%	Timber	2,370.732	5,203.472	1,430.373	9,004.58
	Rattan	17.557	59.680	16.342	93.58
	Oil palm	947.734	2,086.298	1,080.894	4,114.93
	Total	3,336.02	7,349.45	2,527.61	13,213.08
5%	Timber	1,714.535	3,424.806	1,047.603	6,186.94
	Rattan	10.800	32.751	10.174	53.73
	Oil palm	431.501	949.886	492.129	1,873.52
	Total	2,156.84	4,407.44	1,549.91	8,114.19
8%	Timber	1,401.255	2,594.312	864.228	4,859.80
	Rattan	7.762	21.439	7.427	36.63
	Oil palm	215.653	474.729	245.953	966.34
	Total	1,654.67	3,090.48	1,117.61	5,862.76
10%	Timber	1,272.999	2,262.865	788.863	4,324.73
	Rattan	6.578	17.311	6.368	30.26
	Oil palm	136.649	300.814	155.849	593.31
	Total	1,416.23	2,580.99	951.08	4,948.30
15%	Timber	1,075.832	1,772.728	672.331	3,520.89
	Rattan	4.858	11.776	4.855	21.49
	Oil palm	21.978	70.394	36.470	138.84
	Total	1,112.62	1,854.90	713.66	3,681.22

logging option stands at RM8.5 billion in timber stumpage and RM95.5 million in rattan revenue. The estimated foregone benefits in this study do not take into account the added value of each commodity nor the potential job opportunities that may be generated from the various sources. If all of these benefits were to be considered with their multiplier effects, the total foregone benefits will be far greater than the estimated value. Likewise, the benefit stream estimated for TN conservation does not take into account a number of other positive externalities such as hydrological and water catchment functions. Capturing the economic values of such function will add to the merits of TN conservation.

It will be important to note here that the focus of this study is not to fine tune the estimation of economic values of TN resources. This is due to the sensitivity of the estimated values to the presumed level of pricesof goods and services (timber, rattan and carbon) as well as the choice of discount rates. As evidenced in this study, varying prices and discount rates would produce different TEV and policy outcomes. While the choice of carbon and palm oil prices is based on clear conservative or lower bound estimates, the choice of a representative discount rate can be rather contentious. The low discount rate whichits outcome favors the continuation of the status quo option (forest conservation) theoretically reflects the preference of society at large for future consumption or future benefit stream over current consumption. The choice of discount rate that reflects societal preference in aggregate shall then be a national policy issue. Nevertheless, regardless of the discount rates used, findings have clearly shown the scale and order of magnitude for each forest management options and its resulting equity implications. This remains the gist of this study.

Policy recommendations at the national level include the establishment of a forest conservation fund, particularly a specific national conservation fund for TN. Along with the establishment of such fund, we also propose the establishment of a public policy framework for the payment of compensation (including in-kind compensation) to those affected by forest conservation policy, similar to the concept of payment for environmental services (PES) which has become increasingly popular in recent years. Members of the public, corporate bodies and also the international community shall be encouraged to contribute to such funds. A mechanism of benefits sharing of recreational benefits and/or bio-prospecting between the federal government and state governments is also proposed in light of the equity impacts. Currently, revenue from recreation is accrued to the federal government. At the international level, on-going conservation and emissions reduction programs such as the Global Environment Facility (GEF) and Reduced Emissions from Deforestation and Degradation (REDD+) need to take into account the equity implication, particularly those that emanate from long, pre-existing conservation programme such as the Malaysian Taman Negara. Malaysia along with regional platform (ASEAN) and/or like-minded countries may need to champion such an important global cause. Furthermore, before any vast swathe of natural resource (forest) is gazetted as a protected resource, it ought to be preceded by a comprehensive economic assessment of efficiency and equity issues.

REFERENCES

Ahmad Mohd Zin. 2004. Analisis Ekonomi Alternatif Gunatanah: Kajian Kes Taman Negara Malaysia (Economic Analysis of Landuse Alternatives: Case of National Park, Malaysia).Unpublished Ph.D thesis, Faculty of Economics and Business, National University of Malaysia, Bangi.

Berger, R. 1990. *Malaysia's Forest, a Resource without a Future?* Sussex, England: Packard Publishing Ltd.

Brookshire, D. S., Randall, A. & John, S. 1980. Valuing increment and decrements in natural resource service flows. *American Journal of Agriculture Economics* 63: 165-177.

Brown, S., Iverson, L. R. & Lugo, A. E. 1994. Land-use and biomass changes of forest in Peninsular Malaysia from 1972 to 1982: A GIS Approach. In *Effects of Land-Use Change on Atmospheric CO_2 Concentrations: South and Southeast Asia as a Case Study*, edited by Dale, V. H., 117-144. New York: Springer-Verlag.

Collins, N. M., Sayer, J. A. & Whitmore, T. C. 1991. *The Conservation Atlas of Tropical Forests Asia and the Pacific*. London: Macmillan Press Ltd.

DWNP. 1987. *A Master Plan for Those Areas of Kelantan, Pahang and Terengganu Collectively Known as Taman Negara*. Kuala Lumpur: Department of Wildlife and National Parks. Mimeo.

JPSM 1988. *Perangkaan Perhutanan Semenanjung Malaysia*. Kuala Lumpur: Forestry Department of Peninsular Malaysia.

JPSM 1988a. *Laporan Inventori Sumber Rotan dan Buluh Negeri Pahang Darul Makmur 1981-1982*. Kuala Lumpur: Forestry Department of Peninsular Malaysia.

JPSM 1988b. *Laporan Inventori Sumber Rotan dan Buluh Negeri Kelantan 1981-1982*. Kuala Lumpur: Forestry Department of Peninsular Malaysia.

JPSM 1988c. *Laporan Inventori Sumber Rotan dan Buluh Negeri Terengganu 1981-1982*. Kuala Lumpur: Forestry Department of Peninsular Malaysia.

JPSM 1997. *Manual Kerja Luar Sistem Pengurusan Memilih*. Kuala Lumpur: Forestry Department of Peninsular Malaysia.

JPSM 1997a. *Inventori Hutan Nasional Ketiga: Negeri Pahang*. Kuala Lumpur: Forestry Department of Peninsular Malaysia.

JPSM 1997b. *Inventori Hutan Nasional Ketiga: Negeri Terengganu*. Kuala Lumpur: Forestry Department of Peninsular Malaysia.

JPSM 1997c. *Inventori Hutan Nasional Ketiga: Negeri Kelantan*. Kuala Lumpur: Forestry Department of Peninsular Malaysia.

JPSM 1998. *Perangkaan Perhutanan Semenanjung Malaysia 1998*. Kuala Lumpur: Forestry Department of Peninsular Malaysia.

Mc Neely, J. A. 1988. *Economics and Biological Diversity: Developing and Using Economic Incentives to Conserve Biological Resources*. Galand, Switzerland: IUCN.

Mohd Shahwahid, H. O., Awang Noor Abdul Ghani, A. G., Abdul Rahim, N., Zulkifli, Y. & Razani. U., 1997. *Economic Benefits of Watershed Protection and Trade-off with Timber Production: A Case Study in Malaysia.* Economy and Environment Programme for Southeast Asia. Mimeo.

Munasinghe, M. 1993. *Environmental Economics and Sustainable Development*. Washington, D. C: The World Bank.

Pearce, D. & Moran, D. 1994. *The Economic of Biodiversity*. London: Earthscan.

Sheeran, K. 2001. Rethinking equity and efficiency in mitigating climate change. *International Journal of Economic Development* 3(4):1-16

Turner, R. K. 1992. Ecological Economics as an Assessment Technique in Wetland Protected Areas, *Proceedings of the Wetland Workshop on Assessing and Monitoring Changes in Wetland Parks and Protected Areas, held in the Broads*, 9 - 13 October 1992.

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APPENDIX I

1. Estimation of non use value of Taman Negara biodiversity (TN)

We administered an open-ended format Contingent Valuation (CV) survey to estimate the non-use value of Taman Negara services in August 1999. Some 240 respondents in Taiping (Perak state) and Nilai in Negeri Sembilan state were sampled. These two towns are considered as middle category in population size as well as development phase, but differ significantly in terms of distance to TN. The constructed market in the CV section presumed a reduction of 10 percent in federal government budgetary allocation for TN such that it would lead to lower enforcement measures and consequently a decline in environmental and biodiversity quality of TN by 10 percent. Respondents were asked how much they would like to contribute to a TN Trust Fund annually such that the presumed degradation can be avoided (equivalent surplus welfare criterion).

The linear specification for the WTP response model to elicit the non-use value for TN resources is written:

$$LnWTP = f(D\_state, age, D\_Edu, D\_Quality, Income)$$

Where;

LnWTP = Willingness to pay (natural logarithm)
D_state = Dummy for state (1 = Negeri Sembilan, 0 = Perak)
Age = Respondent's age (ratio data)
D_Edu = Dummy for education level (1= university level education, 0 = otherwise)
D_Quality = Dummy for environmental quality (1 = positive attitude towards natural environment, 0 = otherwise)
Income = Household income (ratio data)

The results of the model are shown in Table A1 below.

Results suggest income and education level influences the level of willingness to pay significantly. The mean willingness to pay for all samples was estimated at RM12.32 per non-user household respondent annually.

2. Estimation of recreational use value of Taman Negara

The single bounded dichotomous choice CV was used to elicit the use value of recreational services provision of TN. Two CV sets were employed. The first utilized "admission fee" as the payment vehicle while the other considered annual payment to a "TN Development Fund". Some 300 user respondents were interviewed onsite in May 1999. Respondents were equally distributed to each CV set. The constructed market considered a 10 percent reduction in federal government budgetary allocation for TN such that it would lead to a decline in enforcement measures and hence the quality of recreational services would deteriorate by 10 percent. Graphical illustrations of the potential degradation focussing on recreational attributes were shown to each respondent. Four levels of posted price (RM2, RM5, RM20 and RM40) were employed for the two CV sets.

The logistic model to elicit the recreational use value for TN is specified:

$$Ln\left[\frac{P_i}{1-P_i}\right] = \beta_0 + \beta_1 D\_CVset + \beta_2 Age + \beta_3 D\_Ethnic + \beta_4 D\_Edu + \beta_5 D\_Income + \beta_6 Bid$$

Where;

D_CVset = Dummy for payment vehicle (1= contribution to TN Development Fund, 0 = otherwise)
Age = Respondent's age (ratio data)
D_Ethnic = Dummy variable for ethnic (1= Malay, 0 = others)
D_Edu = Dummy for education level (1= tertiary education, 0 = otherwise)
Income = Household income (ratio data)
Bid = Posted Price
P_i= Probability of respondent responding "Yes" to the posted price

The results of the binomial logistic regressions are shown in Table A2 below:

TABLE A1: Results of regression model for non-use value of TN

Variables	β	Std. Error	T ratio	Significant level
Constant	1.795	0.276	6.510	0.000***
D_state	-0.01945	0.143	-0.136	0.892
Age	0.0007167	0.007	0.101	0.920
D_edu	0.432	0.160	2.692	0.008***
D_Quality	0.171	0.148	1.152	0.251
Income	0.0002205	0.000	7.352	0.000***
R Square = 0.288; F Test = 16.007; Durbin-Watson = 2.058				

***Significant at a = 0.01

TABLE A2: Results of binomial logistic regression for recreational use value

Variables	β	S.E	Significant level	Exp (b)
D_CVset	0.757	0.285	0.008***	2.132
Age	-0.001	0.018	0.951	0.999
D_Ethnic	-0.258	0.352	0.464	0.773
D_Edu	0.457	0.313	0.144	1.580
Income	0.269	0.069	0.000***	1.309
Bid	-0.054	0.008	0.000***	0.947
Constant	-0.168	0.678	0.804	0.845

***Significant at a = 0.01

Integrating the area under the logistic curve between the minimum posted price (MYR1) and maximum bid (MYR40) yielded the mean willingness to pay (WTP) equal to MYR23.27. This WTP estimates reflect the net benefit of recreational experience in TN per respondent annually.